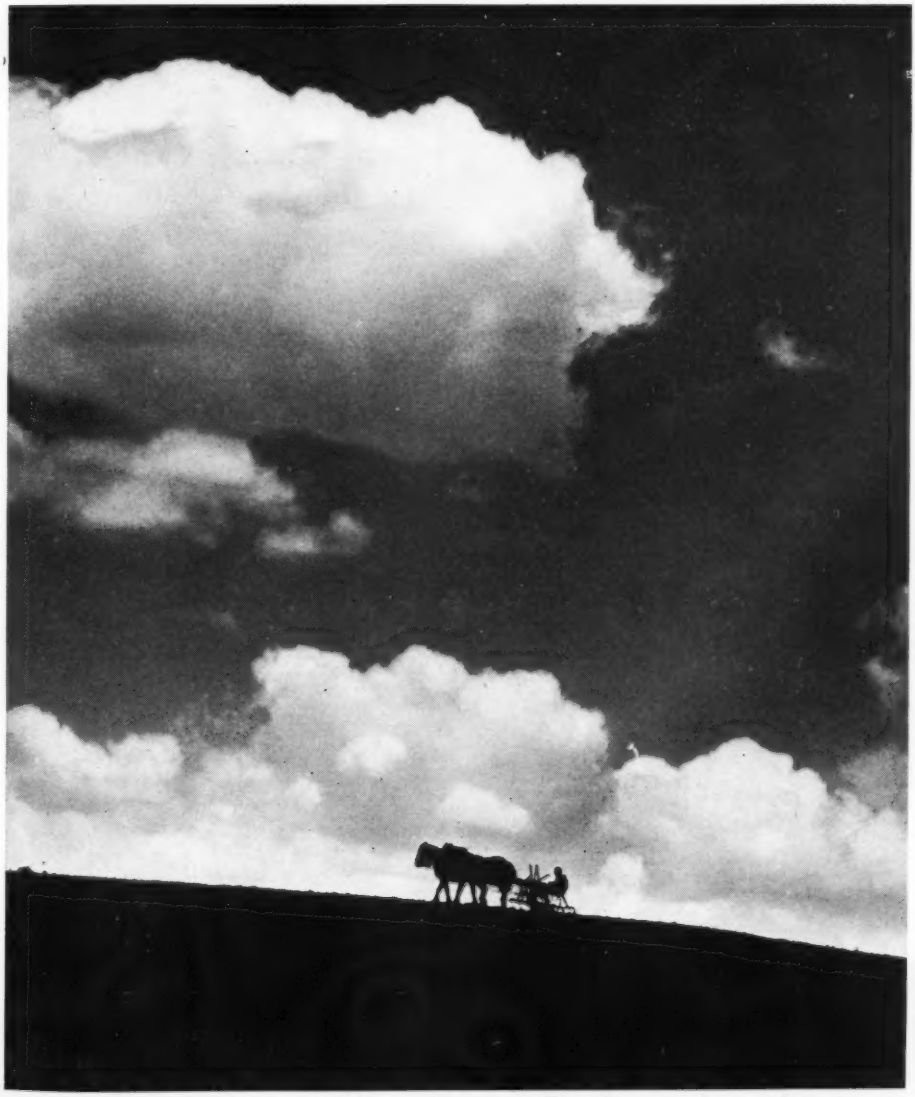
Better Crops WITH PLANT FOOD

October 1937 10 Cents



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AMERICAN POTASH INSTITUTE, INC.
INVESTMENT BUILDING **WASHINGTON, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. Stinchfield, *Editor*
Editorial Office: Investment Bldg., Washington, D. C.

VOLUME XXI NUMBER TEN

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American Potash Institute, Inc.
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SIDES ARE TAKEN AND MANY ARGUMENTS SETTLED ON THE WAY HOME FROM SCHOOL.

Better Crops with PLANT FOOD

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VOL. XXI WASHINGTON, D. C., OCTOBER 1937 No. 10

Jeff contemplates on more than--

Just a Milk Shake

Jeff McDermid

AS the butter-consuming season waxes and the ice cream season wanes, I feel it incumbent upon myself to churn about a bit in the topic most familiar to my dear but stubborn friends. That topic concerns what the dairy industry can do to obtain for itself a slice of that security which corn-hogs and cotton are always seeking without much luck in the face of grasshoppers, hot winds, politicians, and the cost-price ratio.

While milk is produced in driblets in every farming community which is not too lazy to pull teats, a flood of it occurs only in six or seven major dairy States, whose leaders naturally think they speak for the whole industry. In those States long association with the temperamental-natured dairy cow has given a goodly degree of both temper and temperament to the fellows who lean their brows against the pulsating flanks of bovines night and morning, seven hundred and thirty times a year.

To be sure, a few of their hasty critics point out that considerable "bull" has been transfused simultaneously, but I shall not beller about that for the present. For that vagary involves itself in oleomargarin jitters and foreign import bogies and blues—both of which, I maintain, only keep the dairymen in good gymnastic trim through shadow-boxing. The more

important considerations are the only ones worthy of a noble intellect, like mine.

One of the first confusing points to clear up once and for all (or at least until Congress re-convenes) is the nature of the relationship of industrial conditions to the dairy situation. During the depression I heard it squawked hundreds of times that there was a large surplus of milk and manufactured dairy products because of a very low consumption.

IN THE case of fluid milk and cream, and ice cream too, this statement was probably true, but with manufactured dairy items which carry the bulk of the industry's output, this was a gross and a careless error. Although possessing all the exact official estimates of what happened, my intentions are kindly, and I shall not bore you like a buttermaker uses his trier, by declaiming all the digits.

But should you wish me to act as guide along the mazes of that cyclorama of erudition installed in the BAE building in Washington, I can show you a figure wizard or two who offer evidence in cold storage vaults to upset all that clatter about overproduction. They will tell you that from 1931 to 1934 the actual consumption of butter, cheese, and evaporated milk in this country was very much greater than it was in the period before the panic.

Each year of the times when dairymen were in a dilemma, the good people on the consuming end gobbled up more of those manufactured milk products than they did from 1925 to 1929—but that's not the whole story! During that interval of depression, consumers took 32 per cent *more* evaporated milk at 10 per cent less ex-expenditure; 11 per cent *more* butter at 40 per cent *less* expenditure; and 5 per cent *more* cheese for 32 per cent *less* expenditure.

This left the cow man stranded between debts and drought, and all he had left was his trusty right! No wonder he wanted to punch somebody for awhile.

Thus we have something clearly established as our first anchor in the turbulent sea of milk. First, the dairy industry has risen in its popularity as a caterer to ordinary appetites. Second, there is hardly any direct connection between the volume of industrial production and the amount of dairy manufactured products consumed. Third, there is a direct relation between the wages paid, or the income of industry, and the prices received, or the income of the dairymen.

I trust you see the difference, but I won't blame you if you get lost a bit; for I did many times while groping around, a trifle groggy from many statistics, seeking to find the exit from the BAE annex.

SO YOU'D better just remember that chief benefit to the dairy industry lies in a high rate of domestic employment, at good wages; and that a whole lot of this guff about a fluctuating per capita production and consumption of dairy products is mostly banana oil. The dairy industry is not only the greatest single avenue of farm income in America, but its production and consumption are more uniform than those of any other staple farm commodity. By and large, the dairymen have a domestic puzzle on their hands, with only a distant, indirect relationship to the volume of export trade in agricultural goods. Having set down the first guide-post, that of good wages for the masses, we have another point to make closely related to this, and the solution of which would remove the occasional, temporary, so-called surplus of dairy products—which creates a dubious, jittery price curve for the producers.

Speaking then of good wages, and assuming that 1929 is regarded as a

period of good wages, the facts are that eight million non-farm families were then in such low income groups that adequate diets were impossible for them to provide. Even now as we talk of returned prosperity, I find

that in the metropolis of a leading dairy State there are hosts of poor families unable to buy milk, dairy products, eggs, and fruits sufficient to raise healthy, normal children. The "border line" cases, or those where parents earn meager wages, are worse off than the families under public relief supplies.

HENCE getting folks back to work does not tell the story until we know what their earnings are above the subsistence level—and it is right in this class where the dairy industry can get in its mutual welfare work. I say "mutual" welfare because by aid to undernourished mothers and children in low income groups you are not "subsidizing" folks able to earn money; and moreover, by distributing milk and dairy products to such persons wisely under Government subsidy, you ease the pressure of the so-called surplus—or wipe it out completely—and create good will and good food habits at the same time.

How do we get the mazuma? A natural question this, as Congres tightens the reins. Have no fear, as I have it all thought out as usual. We either take a straight Federal grant outright, or we approach it by asking for an amendment to an existing Federal law. This law provides for the removal of 30 per cent of the annual customs receipts of the Government for use by agriculture in handling or diverting or otherwise settling the surplus question.

TO DATE the dairy industry has secured less than half of one per cent of this allocated sum annually. Its rightful share, if we assess it according to the dairy industry's proportion of the total farm income, would be at least twenty per cent; and twenty per cent of thirty per cent is six per cent. Which means, as I have discovered by another knock at the door of erudition in Washington, amounts to fully thirty million smackers per annum. And part of that sum would be derived from duties on imported dairy products too.

Say we "ear-mark" thirty million dollars in a sort of surplus-reserve fund, by act of Congress in 1938, dedicated to maternal and child welfare via the dairy route. Pretend that Congressmen were agreeable to it, and we also provided that instead of the sum being doled out by bureaucrats and measured in red tape, we put it under bond in the hands of competent and responsible cooperative dairy-farm organizations to spend solely for bringing the foster mother of the human race to the doors of the poor and needy. I have enough respect for the purveyors of dairy products who are not farmers to assume they would slice off a little of their velvet if the producers put their surplus milk into such a pool at manufactured milk prices.

Subsidized consumption rather than restricted production is the plan I propose. Long association with dairymen east and west, north and south,

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Raising Quality Fruit On a Large Scale

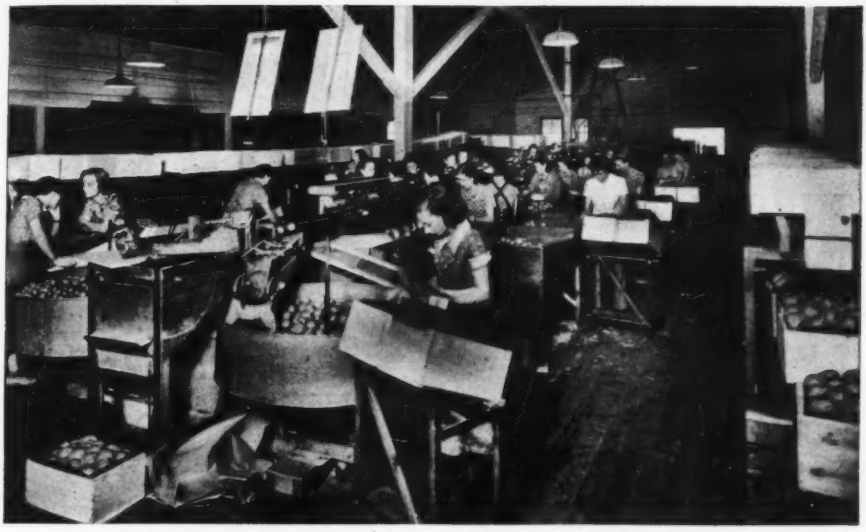
By Clay A. Whybark
Puyallup, Washington

SUCCESS with apples depends on many factors, some of which are not fully appreciated by the commercial grower. One of these important factors is proper fertilization of the orchard. The grower should realize that for every ton of apples that he removes from his acreage he is taking 2.6 pounds of nitrogen, 0.2 pounds of phosphoric acid, and 3.8 pounds of potash from his orchard soils. These figures do not include the amounts necessary for growth and renewal in the trees. This additional requirement for plant food is appreciable. Many commercial orchardists have realized this requirement and actual loss of minerals and are now taking steps to overcome this drain on their soils.

The Congdon Orchard located near Yakima, Washington, is an example of a commercial orchard where definite results have been obtained from the proper balance of mineral plant foods in the fertilizers used. This orchard has approximately 419 acres of bearing fruit and during the past 8 years has used 1,687 tons of mixed fertilizer. The production manager studies the condition of the trees and either increases or decreases the ratio of the different elements in the fertilizer mixture, thus making a varied program.

The entire orchard is divided into tracts, and a record is kept of the fer-

There are numerous tracks of well-fertilized apple trees in the Congdon Orchard.



One of the three washing units used in packing pears at the Congdon Orchards.

tilizer application and crop yield for each tract. To give the reader a better understanding of the fertilizer practices on this orchard it would be well to give the program for some of these tracts.

The following (with application at per acre rates) was used on the pear orchard:

1. Fall of 1929 for 1930 crop, 750 pounds of 3-10-10 mixed fertilizer plus 750 pounds of 1-10-10 mixed fertilizer, with an addition of 1,000 pounds of gypsum.

2. Fall of 1930 for 1931 crop, 1,500 pounds of 3-10-10 mixed fertilizer.

3. Fall of 1931 for 1932 crop, 1,500 pounds of 3-10-10 mixed fertilizer.

4. No fertilizer for 1933 crop.

5. Spring of 1934 for 1934 crop, 1,870 pounds of 8-5-12 mixed fertilizer.

6. Spring of 1935 for 1935 crop, the northern half of the orchard was fertilized with 489 pounds of 6-8-6 mixed fertilizer per acre. The southern half was fertilized with 1,291 pounds of 8-5-12 mixed fertilizer per acre.

7. Spring of 1936 for the 1936 crop, the northern half of the orchard was fertilized with 941 pounds of 6-8-6 mixed fertilizer per acre, and the southern half with 1,592 pounds of 8-6-8 mixed fertilizer per acre. The yield record on this 22-acre pear orchard is given in the following table:

Year	Boxes of Pears
1930	694
1931	674
1932	678
1933	728
1934	821
1935	830
1936	794

Before the fertility problems on this orchard were studied and its plant-food requirements met, the planting produced around 500 boxes per acre of poor quality pears. The fertilizer program has produced an average yield (over 7 years) of 745.6 boxes of pears per acre, and they are of the best quality. This is an increase of 245.6 boxes per acre, due to proper fertilization.

The lack of a fertilizer application for the 1933 crop had no effect upon the yield for that year, showing that there evidently is some carry-over from one year to the next in this pear orchard. The high level of productivity was maintained in 1934 by an extra heavy application of mixed fertilizer.

The following program (with application at per acre rates) was used on one of the apple tracts:

1. Fall of 1929 for 1930 crop, 1,000 pounds of 3-10-10 mixed fertilizer plus 1,000 pounds of gypsum.
2. Fall of 1930 for 1931 crop, 1,000 pounds of 3-10-10 mixed fertilizer.

Winesap apple tree well fertilized for the past 8 years with a complete fertilizer high in potash.

3. Fall of 1931 for 1932 crop, 1,000 pounds of 3-10-10 mixed fertilizer.
4. No fertilizer for 1933 crop.
5. Spring of 1934 for 1934 crop, 918 pounds of 3-10-20 mixed fertilizer.
6. Spring of 1935 for 1935 crop, 880 pounds of potash plus 880 pounds of bone meal (4-15-0).
7. Spring of 1936 for 1936 crop, 530 pounds of potash, plus 530 pounds of bone meal (4-15-0), plus 161 pounds of 3-10-10 mixed fertilizer.

It is interesting to note that in 1933 when no fertilizer was applied, the yield dropped to 462 boxes per acre. Evidently in this tract the carry-over of fertility has not been great enough to maintain high production.

The yield for this 33-acre apple tract is given in the following table:

Year	Boxes of Apples
1930	805
1931	734
1932	774
1933	462
1934	814
1935	582*
1936	856

* In 1935 due to a very early freeze, several thousand boxes of apples on this tract were not picked.

The value of a good fertility program is clearly shown by studying the yield records before fertilizer was used and after it had been used over a period of years. A 3-year average before the fertilizer program was started shows an average yield per acre of 499 boxes. A 5-year average (not including the year no fertilizer was applied and the year of the early freeze) after the fertilizer program had been started, shows an average yield per acre of 796.6 boxes, or an increase of 297.6 boxes per acre. This increase is due to the proper use of mixed fertilizer.

A good fertilizer program not only increases the yield per acre but im-

(*Turn to page* 41)

Winesap apple tree fertilized twice with sulfate of ammonia and once with manure during the past 8 years.

Type of terrace constructed. The raw ditches make the fields look ragged, and many visitors say, "they take up one-third the land." But they have halted erosion.

We Do Some Terracing

By F. H. Jeter
North Carolina State College of Agriculture

JERRY HENRY is partially responsible for the idea. Last fall, I met him in Charlotte for the purpose of coordinating our Extension Service and Soil Conservation Service radio programs, and in the course of our discussions he inquired if I had ever had my farm terraced. Jerry, by the way, was at that time head of the editorial division of the Soil Conservation Service regional office at Spartanburg, South Carolina. He knew, therefore, something of the ravages of erosion throughout the upper part of that state, especially in Union County where my acres are located.

I told him that Robert, the tenant, had some fairly good terraces on the place, but that these had been laid out mainly by the eye, and in times of heavy rainfall they frequently broke, allowing water to run unobstructed across the most fertile soil and washing to the creek much valuable plant food. Naturally, when one pays out hard-earned money for fertilizer and then top-dresses his cotton and corn with nitrate of soda and potash to give the crops that extra push they need so badly on average southern soils, he hates to stand by and see water laden with these fertilizing elements and precious topsoil go wending its way to foreign places.

Robert and I had discussed his terraces several times as we walked about over the place. Every winter and early spring Robert had placed brush in the broken places and had "plowed up" the terraces with a turn plow. Usually if a bad break occurred at some point Robert would drop the

terraces a foot or two down the hill in an effort to overcome the strain at that particular point. But this did not solve the problem. Then, too, the old-fashioned, narrow terrace is a place for the multiplication of weed seed, which makes cultivation more arduous than it should be.

So we had discussed the whole matter at considerable length. Since we had been operating the farm, we had determined to build it up. Our program called for the adoption of a definite crop rotation, the use of improved seed, the planting of lespedeza on the small grain, the seeding of soybeans and cowpeas on small grain stubble where there was no lespedeza, and careful work to control those gullies already formed. Robert had built some stone dams in the larger of two gullies and had followed my suggestions about brush dams held in place with stakes. We had planted honeysuckle vines at the head of the gullies and kudzu on the banks lower down. We had changed the fertilizer formula, bought new seed supplies, and done other needful things as the farm income would permit.

Last winter we covered some outhouses that needed new roofing and purchased a new combination fertilizer distributor, planter, and stalk cutter. We figured that was about enough spending for this season, but those who recall weather conditions in the Southeast last winter will remember that it rained hard and almost incessantly. Robert and I walked over the place one morning in late winter and saw places where the topsoil was completely washed away. That decided us, so I wrote Jerry at once asking him to give me the procedure for having modern terraces built. He explained how and we made our plans.

Getting Under Way

First we joined the Union County Soil Conservation Association, paid our dues for 1937, and signed an agreement with the Association that we would attempt to follow its program. To our consternation, however, we found that the local CCC camp could not cooperate with the county terracing unit to handle our particular farm because it happened to be just outside of the territory assigned to that camp. By some means, however, the bright

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Robert and his boys have promise of a good crop, though somewhat late, because we waited until the terraces were built. This cotton was fertilized with 300 lbs. of a 4-8-4 per acre and top-dressed with 100 lbs. of nitrate of soda and 50 lbs. of muriate of potash per acre.

The Use of Soil Tests In Conservation

By Ford S. Prince
Agronomist, New Hampshire College of Agriculture, Durham, New Hampshire

THE Agricultural Conservation program is designed to encourage a farmer to make more effort to maintain the fertility of his soil than he has been in the habit of doing. It seems likely that permanent and eager participation in the program will be closely allied with immediate returns to the farmer himself.

In making this statement we are not unmindful of the fact that the community at large must benefit from the program, else the use of public moneys would not be justified. At the same time, even though the farmer contributes the lesser part of the funds in most cases, he expects to be able to see the fruits of his labor and expenditures just as though he had made the entire contribution himself.

It has been unfortunate from our point of view in New Hampshire that some sections of the country have emphasized the need for lime and superphosphate so strongly as to exclude the idea that potash and nitrogen are necessary for soil improvement. The idea even got abroad in certain communities somehow during the past spring that farmers there could spend all their Conservation allotments for lime.

Admittedly, our soils are practically all acid and are becoming more so. But we are not willing to admit that if a soil is within the reaction range of optimum red clover it will pay to buy lime to grow the crop, especially if phosphorus or potash or some other factor is lacking to produce a satisfactory yield. Clover will not grow on our New Hampshire soils with lime alone. A proper nutrient balance must be maintained for its success. This has been demonstrated and proved by experimental work at many points over the State.

If in this instance lime is applied where it is not really needed and the clover fails, the farmer becomes discouraged and is not likely to be eager to participate in the future. Furthermore, before that lime is actually needed to produce a good clover crop much of it will probably have dissolved and leached away by normal soil processes, and part of the effort will have been wasted. Clover and lime have been coupled together in this instance merely as a concrete case to illustrate the point, not that we doubt the efficacy of lime on clover or its necessity for the crop on many soils.

Indicates Fertility Needs

We have rather turned to the quick soil test as a guide to help keep the program running straight and smooth in this State. During the year more than 2,000 samples of soils have been tested, and recommendations have been sent to farmers based on these tests. By far the greater number of soils were tested as a result of the conservation effort, the result of the desire of farmers to find out how best to direct their expenditures.

A rapid soil test is the simplest guide to the fertility needs of a soil. It has its limitations and sources of

error. Drainage or lack of it, weather, and perhaps the farmer himself limit its usefulness. Faulty handling after sampling or failure to cover all the variations in the field when sampling are sources of error. Even the chemist might make a mistake in the test by an error in reading, by using poor chemicals, or something of that sort. But with all these possible limiting factors, good results have usually followed the carrying out of recommendations so far as we have had a chance to observe.

Before using the tests as bases on which to make recommendations in New Hampshire, our chemists first tried methods developed by various workers and chose the ones which seemed best fitted to the soils of the State. These tests were then applied to soils of plots with known productivity from various experimental fields to formulate a basis for recommendations. With this as a foundation we have felt a little more confident about making recommendations for fertilizer and lime usage.

In order to find out where we stood with respect to lime needs and to the available plant-food resources of the State, we picked 1,000 samples at random from those which were tested during the past 12 months and summarized them. Not that a summary like this means much to the individual farmer, but to the chemist and especially to a person making recommendations the data are not only interesting but useful as well.

The following summary shows how the samples tested for pH value:

pH range	*No. of samples*
pH 6.0+	137
pH 5.5-pH 6.0	278
pH 5.0-pH 5.5	468
pH 5.0—	117

In our experimental work we have not found it advisable or practical to lime for alfalfa to more than pH 6.0, or for red clover to more than pH 5.6. In other words, 415 samples or 41.5% of the soils will grow good red clover provided other fertility nutrients are satisfactory, while 13.7% may be expected to produce good alfalfa crops, without lime applications.

Almost half of the samples, 46.8%, need lime in moderate amounts, say from 1 to 1½ tons per acre for red clover and from 2 to 2½ tons for alfalfa, depending upon the texture of the soil in question as well as its organic content. The other 117 samples, or 11.7%, need lime in greater

Many plants show easily recognized signs of plant-food starvation. White clover indicates an acute lack of potash by white spotting around the leaf edges.

amounts for clover and alfalfa and, in fact, should be limed at some point in the rotation no matter what crop is to be grown.

In a State such as ours where potatoes are extensively grown, care must be taken with lime recommendations on farms where this crop is included in the rotation, to avoid potato scab. For potato farms the following recommendations have been adhered to:

On soil with pH 5.3 or above, no lime should be used.

On soil with pH 5.0-5.2 use not more than 500 pounds of lime.

On soil with pH below 5.0 use not more than 1,000 pounds of lime.

Never use more than 1,000 pounds of lime at one application, no matter how acid the soil.

Lime after potatoes have been grown, when seeding down, and never just before planting the crop.

The recommendations given are for ground limestone. Our liming recommendations are probably not so high as many other workers might make. This refers not to potato rotations, but to recommendations in general. We have found in practice, that the law of diminishing returns applies to lime as to anything else. In fact, we say in N. H. Station Circular 44, "Considering the matter of liming from the practical point of view, it seems wise for a farmer to use minimum rather than maximum amounts of lime. This method is easier on the purse, prevents undue losses by leaching where large quantities are applied, and assures a higher rate of interest on the money invested." This is the procedure we have followed in making lime recommendations, feeling that if a farmer limes his soil to the reaction at which the crop may be expected to thrive and then applies all the other things necessary to produce a satisfactory crop, he will come off better than if he uses all his money for liming in excess of immediate crop needs and then neglects other important limiting factors.

Legumes, like the clover in this picture, need all-round fertilization on New Hampshire farms.

The need for magnesium on the soils of the State is indicated by the fact that 399 samples, or practically 40%, tested extremely low for this element. At this point crops that are sensitive to a lack of magnesium are apt to show magnesium hunger. An application of manure may take care of this need on most crops, but potatoes and other crops on which little manure is normally applied should receive magnesium in the fertilizer or in the form of magnesium limestone.

Dairy farmers have not yet felt the need for much magnesium in either fertilizer or limestone. Potato growers and sweet corn growers who do not have much manure to apply are

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Study Starvation Signs On Tobacco and Cotton

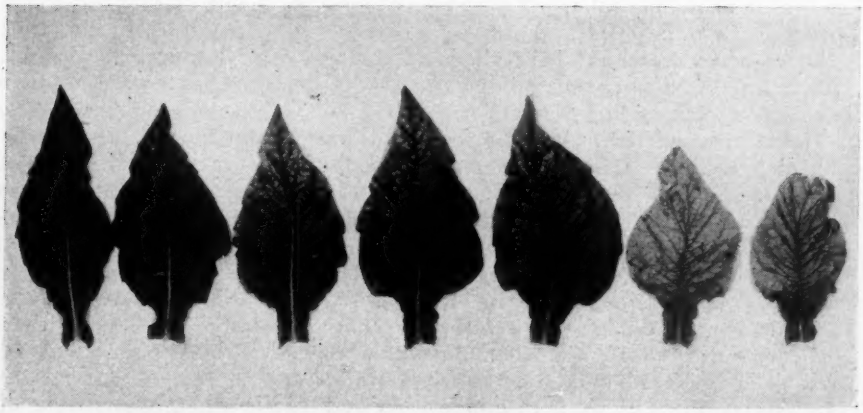
By C. B. Williams
Agronomist, North Carolina State College of Agriculture, Raleigh, North Carolina

DURING the past summer, field observations were made on many fields of tobacco in different parts of North Carolina. These observations have developed the fact that there are large numbers of fields (especially those on the sandier soils) on which the tobacco was suffering from more or less severe symptoms of potash and magnesia deficiency either alone or in combination. In a large number of cases, the deficiencies of the crop were so pronounced as to be materially interfering with the growth of the crop and greatly injuring the quality of the leaves for which the crop is grown. In some cases, the value of the crop was cut at least in half or more.

These conditions can easily be prevented another year by putting enough soluble potash and magnesia in the fertilizer mixtures to fully meet the needs of the crop for a normal, healthy growth. Had these nutrients been applied in sufficient amounts in the early growth of the crop last spring, the deficiencies of the soil, and hence those of the crop, could have been met and the crop made to produce a normal crop, providing no other unfavorable factors had intervened.

Treatment for Tobacco

After the crop is far advanced in growth little can be done in most cases to remedy the deficiencies, yet this is the proper time to study the crop and decide upon the weaknesses in the fertilizers used and what had best be used another year. This is particularly true if tobacco is to be grown on the same fields or on similar soils on the farms the following year. If tobacco is suffering from potash hun-



Sand drown or magnesia deficiency of tobacco—the leaves are arranged from left to right from the top to the bottom of the plant.

ger, certainly more potash must be provided in the fertilizer mixtures. If the tobacco is suffering from sand-drown (magnesia deficiency), then more soluble magnesia should be provided in the fertilizer mixtures for the next year, if this deficiency is to be met and a normal growth of the highest quality tobacco is to be made.

Neither the highest yields nor best quality of tobacco can be produced on any soil that does not, after fertilization, provide sufficient amounts of these constituents in forms available for the needs of normal crop growth. In the case of both of these deficiencies, the symptoms first appear on the lower leaves of the plants and progress upwards as the plants develop. With potash deficiency, the first appearance is at the tips of the lower leaves, evidenced by yellow colored spots and a strong tendency of the leaves to tuck under at the tips. In severe cases, yellow spots change to brown and a complete breaking down of the affected areas of the leaves follows, giving the leaves a ragged appearance. In the case of magnesia deficiency the lower leaves first become light green in color but later they become almost white between the chief veins. As affected leaves fail to function properly and in extreme cases cease almost entirely, if not entirely, the growth of the crop is materially retarded, and the quality of the crop is materially reduced.

Where growers are in doubt about what is the trouble with their tobacco, they should consult their agricultural experiment station, county agent, or vocational teacher.

Treatment for Cotton

Observations made also on cotton grown on the sandier soils of eastern North Carolina have revealed that sand-drown (magnesia deficiency) is quite prevalent. This deficiency of magnesia in available form, particularly on the sandy soils of the Coastal Plain region, causes the affected cotton crop to cease growing normally, and thereby causes a reduction in yield under what would have been secured had soluble magnesia been supplied in the fertilizer mixtures at planting time in amounts adequate for the normal growth of the crop.

It matters not how adequately the amounts of phosphoric acid, potash, and nitrogen in available forms were supplied in the fertilizer mixtures, this

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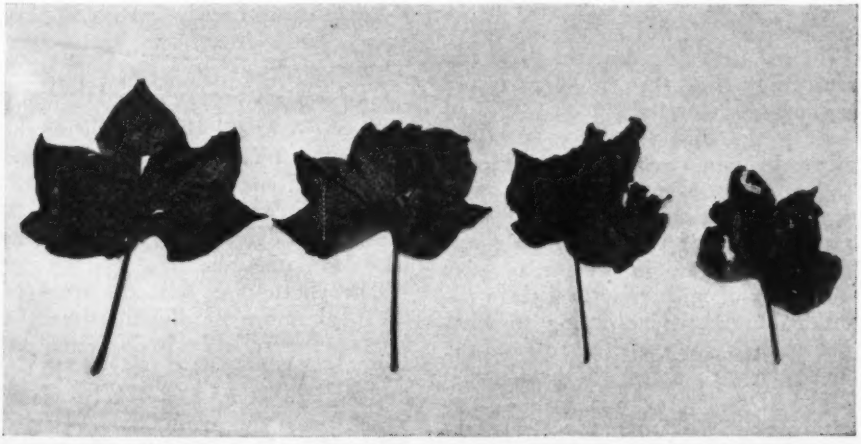

Cotton rust is potash starvation. These leaves show typical cotton rust on plants grown with insufficient potash.

Why Not Ask the Soil What It Wants?

By E. K. Hampson
Hamilton, Ontario

HAPPILY, scientific discovery recognizes no international boundaries, and there is no tariff on ideas. So when a friend of mine in Indiana told me of a plan for soil improvement they were working on in that State, we imported the idea duty free and attempted to work it out in Ontario.

It is so simple and so logical—as most new ideas are—that we wondered why no one had thought of it before. Briefly, you ask the soil what it wants, and then you give it the required diet, dose, or prescription.

The answer of the soil is given by the short route in chemical tests. Relatively accurate levels of available potash, phosphorus and lime are easily and quickly determined by color comparisons with standard charts. Then additions of phosphorus, potash, or lime sufficient to bring these plant-food levels up to a specified base line are made.

In the tests described this base line was arbitrarily taken as 60 parts per million of P_2O_5 and 80 of K_2O. In no case did lime appear to be necessary. In some respects this concept is the same as that of livestock men when they use the term "maintenance ration." But if they want their animals to increase in weight or give quantities of milk, they feed them additional nutrients according to what the animals are expected to produce. Similarly with crops, the base line is supposed to represent a maintenance ration only; but to produce satisfactory yields, the fertilizer diet must be increased.

So we proceeded to secure representative samples of soil from the fields under observation. These were tested by Professor Ruhnke of the Ontario Agricultural College, who prescribed the treatment to be given each field.

Results of Experiments

The first farm was that of Stanley Martin, Melancthon in Dufferin County. Mr. Martin is a well-known and very successful potato grower. His soil varies somewhat but is for the most part a sandy loam, slightly acid in reaction. His soil samples showed a moderate level of phosphorus but the potash was very low. Professor Ruhnke suggested a pre-application of 400 pounds of muriate of potash, to be thoroughly disked in, and 750 pounds of 4-8-10 fertilizer per acre applied at planting time with the fertilizer attachment on the potato planter.

Mr. Martin followed these instructions carefully. During the growing season, which was unusually dry, the "built-up" plot obviously withstood these conditions better than the remainder of the field which had 4-8-10 alone. The lighter color of the foliage was also noticeable.

The photograph tells the story of the final results at digging time. A few rows were left without fertilizer. These yielded at the rate of 107½ bushels per acre; the 4-8-10 alone, which was the main crop, yielded 147½ bushels; while the "built-up"

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Conserving the Benefits Of Soil Conservation

By H. E. Cotton
Wautoma, Wisconsin

FROM the records thus far studied, one outstanding conclusion is that fertilizers, and particularly potash, play an important part in intensifying, multiplying, and making more lasting the results of soil conservation work.

Testimony to this effect has been received from the committee in charge of the program in Waushara county, Wisconsin, and from County Agent E. A. Jorgensen, under whose general supervision the committee's work was done.

The summer of 1936 was a season of severe drought in most parts of Wisconsin. Corn blossoms were burned to a crisp, pastures were bare and brown, and hay was very short. It was certain that federal feed relief would be needed in many localities.

But exceptions were noted, especially on farms where alfalfa seedings had been established. And there were many such farms in Waushara county where alfalfa culture had been a subject of intensive study for some 10 or 12 years under direction of Professor A. R. Albert, director of the Wisconsin Experiment Station branch at Hancock, and County Agent Jorgensen.

The Role of Potash

For instance, in this county there is the 2,200-acre farm of Edward O'Connor, one of the state's "Master Farmers," where large acreages of alfalfa have been a feature for nearly a generation. Mr. O'Connor attributes his success with this queen of forage crops to the persistent use of potash fertilizers, in conjunction with lime and barnyard manure.

Emil A. Jorgensen, County Agricultural Agent, Waushara County, Wisconsin.

Frank Attoe, in the town of Springwater, keeps 12 fine dairy cows on his 80-acre farm and has alfalfa hay to sell. He has been doing farming of the soil-conserving type on his own hook for many years and considers potash an indispensable part of his working material.

The usual method in Waushara county is to apply muriate of potash and treble superphosphate in a 2-1 mix, 125 to 200 pounds to the acre, at the time of seeding.

One more instance to show the possibilities of alfalfa in this county. George Hoeft, in the town of Poy

Dairy cows thrive on well-fertilized alfalfa pasture.

Sippi, has 22 acres of alfalfa from which he took an excellent crop of hay early in the season. He then let it stand until seed ripened, when he took off 76 bushels of high grade seed, worth upwards of $1,200. He plans to keep this field in production with timely applications of potash.

Many more similar instances could be cited. Hence, in the light of past experience, alfalfa was the No. 1 choice of the county's farmers for "soil-conserving" purposes. Lime in several forms was readily available at low cost.

Resisted Bad Weather

Of course, results varied widely, from outstanding success to 100 per cent failure. But the records of the committee show the reasons for such variations. The history of each farm and field records what crops and fertilizers have been applied for several years past.

So, while failures were superficially attributed to drought, Dan Davies, Wild Rose, farmer and a member of the committee, points out that the drought was not limited to the seedings that failed. Drought and heat acted just as severely upon the fruitful fields as upon the others but didn't hurt them.

A check-up of his records proves that where alfalfa seedings and other soil-conserving crops lived through that dry, hot summer, fertilizers of some kind, containing potash, had been applied either at the time of seeding or on crops grown there in former years.

He further estimates that more than 75 per cent of all failures with these crops was traceably due to the lack of plant food in the soil, not merely to drought. Poor methods of handling, seed lacking in vitality, or some accidental condition might account for some of the failures, but he points out that well-nourished seedings are known from experience to resist and survive abuse and adverse conditions to a very great extent.

"Failure to use potash is the outstanding reason for loss of alfalfa seedings," Mr. Davies declares. "Even last summer's drought couldn't whip the plants that had plenty of plant food available."

Typical of successful work with soil conservation is the experience of Edgar Evans of the town of Rose. To add to his acreage of soil-conserving crops, he selected a field of 18 acres where he had raised corn and potatoes in 1935. It is light, sandy soil, pretty well worn out.

Mr. Evans first applied 19 tons of

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C. T. Ames' Camp Proves a Success

By E. B. Ferris
Superintendent, Holly Springs Branch Experiment Station, Holly Springs, Mississippi

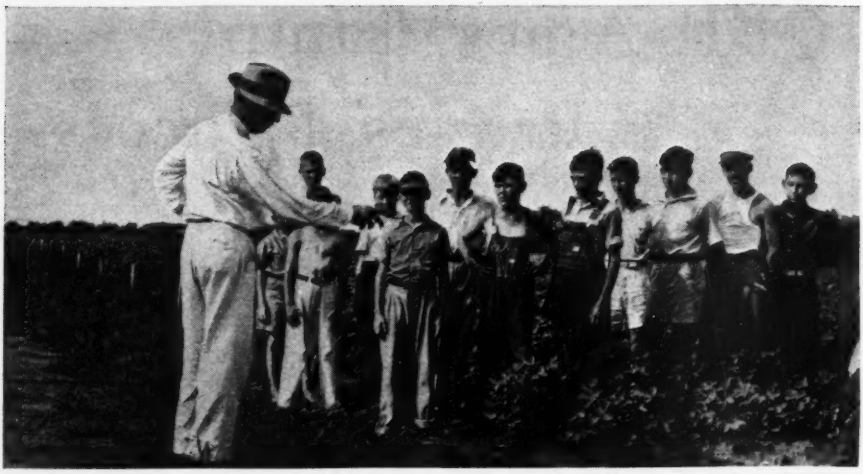
THE late C. T. Ames, Superintendent of the Holly Springs Branch Experiment Station for thirty odd years, has left his impress on Mississippi agriculture as few other men have done. His mental processes were unique, and while a good writer and the most entertaining speaker on farm subjects the State has ever produced, he always felt that despite bulletins, reports, and numerous talks before hundreds of gatherings of Mississippi farmers, he was not getting the work of his station to the farmers and their families in the best way possible. So for years he visioned some better way of reaching farm families, especially the boys and girls, by injecting the element of entertainment and recreation into the more serious one of giving them agricultural instruction.

A Dream Comes True

Having no funds from which he might provide facilities for holding recreational meetings on the experiment station grounds, he was able to do little before the time came during the height of the depression when Government projects for providing work for the idle made such a thing seem possible. Quickly he grasped the opportunity and all but begged the materials and labor for making the start. It took the form of a Club camp, built in almost the exact center of a 200-acre tract of land and in a grove that furnishes ideal surroundings.

The camp house consists of a well-equipped kitchen, dining room, reception room, and sleeping quarters, all built in camp style. A deep well and electric light plant, together with the necessary piping and wiring, furnish water and lights to buildings and grounds. In a rough assembly hall picture shows and all sorts of gatherings for lectures can be held. A large pond covering several acres makes it possible for the boys and girls to enjoy

The late C. T. Ames on the left and M. M. Bedenbaugh on the right, as they stood ready to welcome Club boys and girls.



C. T. Ames in the foreground explaining to a squad of Club boys the effects of different fertilizers in evidence on the test plots.

boating and swimming. While camping parties have used the grounds for a year or more, they were only finished in 1937 and just a few days before the death of Mr. Ames. Doubtless some of the strenuous manual labor connected with getting things ready for the first camp of the season brought about his untimely passing from heart failure last April.

Everyone Welcome

As Mr. Ames' successor as superintendent of the Holly Springs Station, it is most pleasing to note the success of this camp for the first summer after its completion. Thousands of boys and girls and men and women have used it for recreation and study during the season just closing. They came from practically every North Mississippi county and engaged in such pleasures as swimming, boating, baseball, and tennis, besides the things of a more serious nature that in the main prompted their coming.

As a rule the Club boys and girls spend 2 days and nights, and as they retire others come to take their places. Not the least instructive feature of every meeting is visits to the field experiments surrounding the camp where crops growing on the thousands of test plots are shown and the purposes of the experiments are explained. These visitors are by no means confined to boys and girls, but include various organizations of men and women who wish to take advantage of the camp's facilities for a day or overnight gathering. The expense amounts to almost nothing, for such parties of young or older people usually bring their own food and assist in its preparation and serving.

While the camp is used principally by North Mississippi counties, it is not restricted to them. It has been repeatedly used during the past summer by County and Home Demonstration Agents from more distant parts of the State, usually serving them as sleeping and eating quarters while on State-wide tours, which are becoming more and more common as a means of studying the State's agriculture and visiting outstanding results wherever they are to be found. In fact, just recently this camp was used by a party of some twenty-five farmers from South Carolina, being piloted by their teacher of vocational agriculture on a tour that embraced many States. Sunday schools, churches, day schools, and other organizations of so many

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Take the Guesswork Out of Wheat-growing

By John E. Shearer
Indianapolis, Indiana

THERE are certain fundamental principles to follow to be successful in producing a crop of wheat as well as producing any other crop.

This year has been very unusual in many respects. Following a year of drought, this year has had an abundance of moisture with temperatures in most sections below normal and the nights have been cool. These weather conditions have been ideal for the spread of fungus diseases. The prevailing winds from the south made it ideal for the spread of rust, and rust, both red and black, had very damaging effects this year in most of the wheat sections. But the farmer who applied an ample supply of available phosphate and potash in the right proportions to balance the deficiency of these plant foods in the soil came through the ravages of the rust in good shape.

The first essential for a wheat crop is good seed, acclimated and adapted to the section in which you farm. There is no such thing as "seed wheat running out." I have been practicing general farming for 30 years, growing wheat in my farm rotations each year. Every year I clean and grade my seed wheat. I am sowing the same variety that has been grown on this farm for more than 40 years.

The next essential is a good seedbed—a solid bed with a fine mulch on top.

The third and very important essential is an abundance of available balanced plant food. To find the

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The use of a combine is only one of the efficient practices to be considered in growing wheat.

When Do Our Soils Need Potash?

By H. F. Murphy

Agronomist, Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma

SOIL fertility and its maintenance is being stressed in this country today more than it has ever been before. Maximum production, or at least greater efficiency in production per unit of soil area involved, is receiving more than just mere comment. This has forcefully brought the question of plant food and fertilizers before the public, until today many farmers are realizing that they cannot expect maximum or even a paying production of crops on much of their land without the use of some kind of fertilizer. Farmers and communities are rightfuliy becoming "soil minded" and are anxious to know just what they can do to save what soil they have and how they may increase its productiveness. Different agencies are busy helping them solve their soil problems, and a closer relationship between the research worker and the farmer is in evidence. It is the dawn of a new agriculture.

Advanced Methods

While soil and fertilizer usage studies have been made for some time, it has only been during the last 20 years that rapid methods of analysis have made their appearance. The correlation of these data with field data and with the older "complete analysis" data is a decided step forward in our agricultural program. Today, many of the plant-food needs of a soil can be determined rather definitely (if not exactly quantitatively) in a few minutes or at most in a few hours' time. It is not an unusual thing today for the Agricultural Experiment Station and the Extension Division of the state to test many thousand soil samples each year for farmers by some of these so-called quick methods, and to make recommendations accordingly.

Limiting Factors

Various methods are being employed to determine soil deficiencies and the proper kind of fertilizer to use under different conditions. Particularly has the question of phosphorus availability or solubility been studied, and many methods have been published setting forth limits for this important plant-food element. Not as many procedures are available for potash limitation studies, but this does not mean that potash is any less a necessity for good crops. While it is true that many soils are very deficient in active phosphorus, it is also true that potash is limiting crop production in many cases as well. Studies made on Oklahoma soils indicate that where a potash deficiency exists in our soils, a phosphorus deficiency also exists, and that both potash and phosphorus must be supplied in order to get best results. The deficiency in both cases is especially prevalent in the eastern part of the state. In some localities extreme deficiencies occur.

To obtain rather accurate data on potash deficiency, the neutral, normal, ammonium acetate replacement meth-

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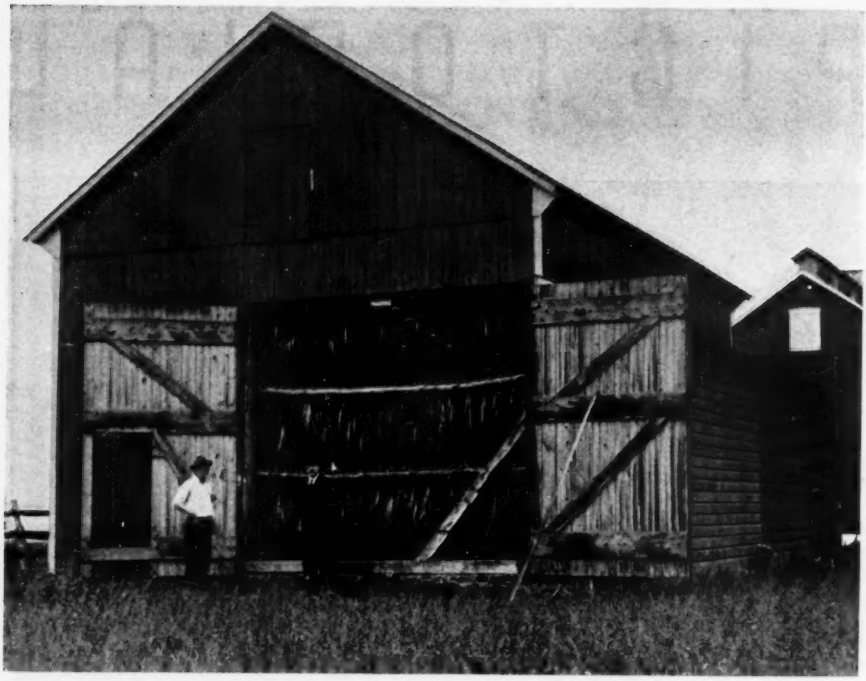
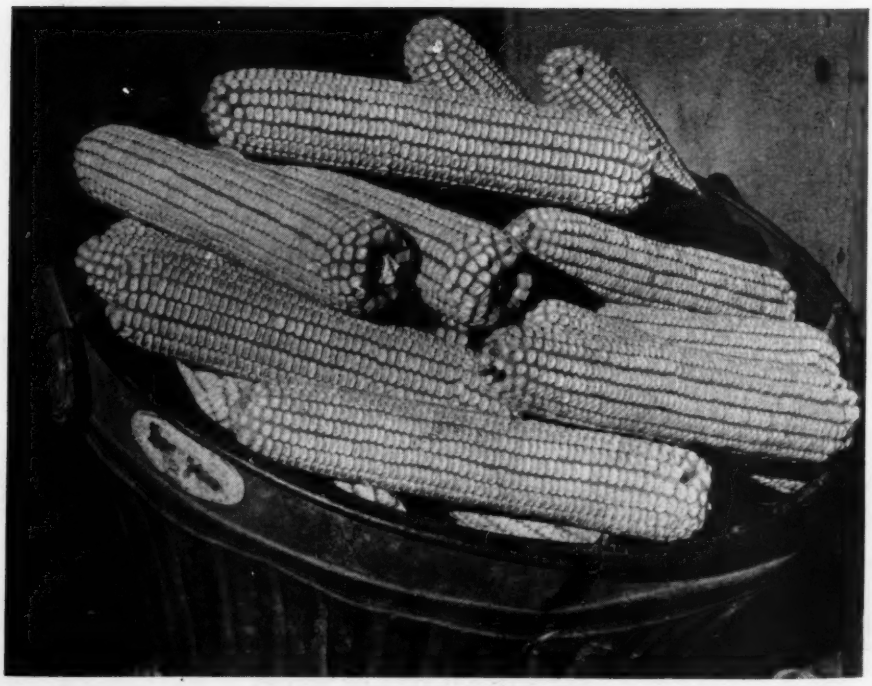
PICTORIAL

THE WORLD IS FULL OF HEROES.



CASH IN THE BARN, TEJAG



, THE BAG, THE BASKET, THE BALE.

The season of long shots and tall stories.

The Editors Talk

Fewer Fertilizer Grades

In the interest of simplification and economy, agricultural advisory groups and fertilizer manufacturers long have advocated a reduction in the number of different fertilizer grades on the market. Some progress has been made, as shown by Vial in 1930 in his study of complete fertilizers sold in Pennsylvania during the period 1900-1928. During the years 1910-1914, except for the year 1912, there were about 200 different complete analyses on the market each year. For the period 1924-1928 this number had been reduced to 85, with many low grades eliminated. The disappearance of fractional analyses in many States has been a step forward. More progress is seen in the growing tendency of States to prohibit mixed goods containing between 0 and 2 per cent of a plant-food element.

Much work is yet to be done, however. For example, Mehring and Smalley in their survey in 1934 report 1,291 different analyses having been sold that year in the United States. While this number includes, as separate analyses, similar grades on N and NH_3 basis, eliminating these would probably leave close to 1,000 different grades on the market. Yet 19 of these grades were used in 20 or more States. There thus would appear to be no necessity for having a completely different set of fertilizer grades merely because a State line is crossed.

In view of this situation, it is encouraging to see the efforts being made to rationalize the situation. A meeting of the representatives of the experiment stations of five Mid-Atlantic States was recently held under the auspices of the National Fertilizer Association. After surveying the fertilizer needs of the soils and crops of their respective States, these representatives agreed on 26 grades that would satisfy practically all requirements. Not all grades are needed in any one State. Four grades are common to all five States and ten common to three or more of the States. Previously, no one grade was recommended in all the States. Twelve grades previously recommended have been eliminated. When the great diversity of soils and crops existing in States ranging from Delaware over to West Virginia is considered, it may be counted somewhat of an achievement that agriculturists in these States have been able to agree on such a relatively few grades.

This, of course, will not necessarily eliminate the great diversity of grades put out by manufacturers, but distinct progress is being made when agricultural officials agree to recommend fewer different analyses and increased stress is placed on the fewer grades agreed upon.

Similar movements are occurring in other parts of the country. Officials and fertilizer manufacturers in the South Central States have been meeting and agreeing on standard analyses for several years. This has resulted in a materially lower number of grades on the market in this region compared to other areas in

the South. The "Standard Nine" of New England, adopted in 1924, are well known in fertilizer circles, and this possibly represents the first interstate cooperative effort at reduction in number of grades. A number of States, especially in the Midwest, have standard analyses which they stress. However, cooperative action including agricultural officials and the fertilizer trade among several States will be likely to produce the most effective results.

In deciding on fertilizer analyses to recommend, it is well to keep in mind that the spread in ratios should be wide enough to cover the diverse soil and cropping conditions that occur in practically all fertilizer-using parts of the country. At times in the past, the ratios were not wide enough to meet all conditions, and the effort toward simplification tended to defeat itself. In some sections new grades of wider ratios actually must be added. Officials and manufacturers have recognized this need and up to the present have wisely refrained from "freezing" the list of grades. The elimination of low analysis fertilizers and small differences between grades is what is sorely needed.

Potash Deficiency Symptoms

One of the most easily understood and recognizable means of gauging the fertility of soils is the symptom of starvation for a particular plant-food element which various plants will show when that plant food is deficient in the soil. While attention to proper maintenance of fertility for profitable production should be given long before starvation symptoms appear, to those growers who have been negligent in this respect, the starvation signs serve as dire warnings of what will follow if steps are not taken to correct the condition.

A new Publication, *Potash Deficiency Symptoms,* just appearing in this country contains a compilation of available information on the occurrence of signs of starvation for this plant food as recorded by 45 of the most important cultivated crops. The book was prepared by Eckstein, Bruno, and Turrentine; was published in Germany; and the text is in German, French, and English. The 55 plates in four colors and the 41 excellent figures in black and white provide an accurate guide for observing the availability of potash in our soils. These illustrations, with a concise explanation of each, take the book out of the scientific library class into the practical hand-book type, and anyone interested in the problems of plant nutrition and fertilizer usage will find much valuable information in it.

"Seeing is believing" is an old adage. In these times with an increasing dissemination of scientific work of importance to individuals crowding their attention, illustrations assume an added value. American agriculture should have more books of the type of the above.

REVIEWS

This section contains a short review of some of the msot practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

An interesting discussion of some soil fertility experiments is to be found in the 1936 Annual Report, Bulletin 296, New Hampshire Experiment Station, entitled "Science in New Hampshire Agriculture." The largest amount of hay harvested from the neglected haylands test resulted when an application of nitrogen, phosphoric acid, and potash was used. The legume test on similar lands indicated that the continued use of 150 pounds muriate of potash per acre increases the yield slightly more than one-half ton of cured hay per acre, regardless of whether it is used alone or in combination with other fertilizer substances. The report concludes that part, if not all, of this increase is due to the influence of potash on the longevity of the crop and more alfalfa persisting where potash is applied. A continuation of the top-dressing of the old pasture experiment near Greenland shows that the application of superphosphate and potash appears to be stimulating growth more than during the first three years of the test. Practically no clover appears on the nitrogen alone treatment, but the application of phosphoric acid and potash definitely brings in clover only a few weeks after it has been applied.

In a three-year top-dressing experiment on grass hays near Durham, a spring treatment with either nitrogen or complete fertilizer considerably outyielded fall treatment, with the exception of cyanamid, where little difference was registered. The report also describes interesting results from the study of potato mosaic. In this work it was observed that potato mosaic was masked by favorable growing conditions. When the plants were grown at a temperature of 15° C., mosaic symptoms appeared, and the yields were lower than in the plants grown at 20° C. The degree of masking was not only affected by the temperature but by the fertility of the soil and type of fertilizer material used. It was found that mosaic tubers grown at 20° C. in a composted soil containing abundant plant-food elements produced plants that had mosaic markings, while in a poor soil to which fertilizer at the rate of 1,000 pounds of an 8-8-16 fertilizer per acre had been added, the plants possessed good healthy dark green foliage without recognizable mosaic symptoms.

Up-to-date methods on fertilizing the southern tobacco crop are prescribed by the fertilizer committee representing this territory in the mimeographed circular, "Recommendations with Reference to the Fertilization of Flue-Cured, Sun-Cured, and Shipping, Tobacco Grown on Average Soils in Virginia, North Carolina, South Carolina, and Georgia for the Year 1938." For bright flue-cured tobacco to be grown on the heavy or more productive soils, the committee recommends a tobacco fertilizer analyzing 3% nitrogen 10% phosphoric acid, and 6% potash, to be applied at rates of 800 to 1,000 pounds per acre. The fertilizer for the less productive soils should contain the same percentages of nitrogen and potash but the phosphoric

acid content may be reduced to 8%, with the application ranging between 800 and 1,200 pounds per acre. As experiments indicate that the acre value may be materially increased by additional potash, it is suggested that a side-dressing of potash supplying 60 to 120 pounds of K_2O to the acre be applied in most cases within 20 days after transplanting. To ward off possible fertilizer injury, the committee advocates placing the fertilizer in bands 3 to 4 inches to the sides of the row at the approximate level of the roots and either setting the plants between the bands or thoroughly mixing the fertilizer with the soil prior to planting. For dark tobacco the use of 600 to 1,000 pounds of 3-10-4 per acre is recommended. Analyses in all cases may be modified, provided the given ratios are maintained and the recommended sources of plant food are used. In effect, the recommended sources of plant foods are similar to those given in the past except for soils where the pH is above 5.6, for which the maximum chlorine content may be 3 per cent. Below this pH the chlorine contained in the fertilizer mixture should be 2 per cent. If non-acid fertilizers are to be produced, dolomitic limestone as the neutralizing agent is suggested.

"Fertilizing Deciduous Fruit Trees in California," Agr. Exp. Sta., Berkeley, Calif., Bul. 610, June 1937, E. L. Proebsting.

"The Effect of Nutrient Deficiency on the Growth of Longleaf Pine Seedlings," So. Forest Exp. Sta., New Orleans, La., Occ. Paper 65, July 19, 1937, L. J. Pessin.

"Liming Massachusetts Soils," Agr. Ext. Serv., Amherst, Mass., Leaf. 134, May 1937, R. W. Donaldson.

"Fertilizer Experiments with Cotton on Heavy Irrigated Soils," Agr. Exp. Sta., State College, N. M., Bul. 248, May 1937, Glen Staten and D. A. Hinkle.

"Minor Elements and Crop Fertilization," Agr. Exp. Sta., Geneva, N. Y., Cir. 168, July 1, 1937, R. C. Collison.

"Responses from Various Sources of Nitrogen Fertilizer," Agr. Exp. Sta., Clemson, S. C., Bul. 309, May 1937, W. R. Paden.

"The Effects of Fertilizers on the Productivity of Sagemoor Fine Sandy Loam Under Irrigation," Agr. Exp. Sta., Pullman, Wash., Bul. 346, Apr. 1937, H. P. Singleton and L. C. Wheeting.

Crops

United States Department of Agriculture Yearbook for 1937 rounds out the work of the Committee on Genetics appointed by the Secretary of Agriculture in 1933. It is a sequel to the 1936 Yearbook on plant and animal breeding, and like the former, Book II covers an enormous and varied field which records a wealth of instructive information invaluable to an interested public. The 1936 volume dealt chiefly with the major crop plants and classes of livestock, while the present one pertains to garden vegetables, northern tree and bush fruits, subtropical fruits, flowers, nut trees, forest trees, grasses and legumes, goats, fowls, fur-bearing animals, honeybees, and finally that good friend of the farmer, his dog. As Secretary Wallace explains, it is not intended that these two yearbooks will complete the account of the efforts of plant and animal breeders in the United States. "On the contrary," the Secretary states, "I would wish these yearbooks to be looked on as pointing the way toward a field of activity that will accomplish much more in the future than has been accomplished in the past. The work of plant and animal breeders . . . has only just begun."

Another very interesting publication of the United States Department of Agriculture that will especially appeal to official agricultural workers is miscellaneous Publication 251, "A History of Agricultural Experimentation and Research in the United States, 1607-1925," by Alfred Charles True. It is the third and final monograph in a series intended to give a comprehensive summary of the history of agricultural education, extension, and research in this country. On the same plan as was followed in the previous monographs, this publication gives typical examples of the work of private individuals and organizations in laying the foundation for the establish-

ment of public agencies for agricultural research. It gives brief summaries of the spread of principal undertakings that developed after the passage of the Hatch Act and the reorganization of the Department of Agriculture as of Cabinet rank.

Information contained in Mississippi Agricultural Extension Bulletin 85, entitled "Winter Legumes," will prove profitable to many cotton belt farmers. Because of the open, mild winters in the South, such crops as bur clover, Austrian winter peas, the vetches, and others make satisfactory growth that not only adds fertility and humus to the soil but serves a most important function of holding the land together. Now as never before, the growing of winter legumes in conjunction with the high percentage of clean-cultured crops grown in this region is being stressed. As the authors point out, the South has 25 per cent of the Nation's cultivated land, but 61 per cent of its eroded land. Lands covered with winter legumes erode much less than when left without cover.

Among the fundamental facts discussed at length are the fertilizer requirements of these legumes which are not generally recognized by most farmers. Winter legumes require mineral plant foods as do the non-legumes and these plant foods should be supplied where they are deficient in the soil. In growing such crops with cotton it would be advisable to apply the minerals used under the cotton to the legume also, thus obtaining a faster and better growth, inasmuch as the minerals added, together with the accumulation of nitrogen from legumes, are returned to the soil when the crop is turned under. Where potash is known to be needed for cotton, an application of 50 to 100 pounds of muriate of potash per acre is advised for the legumes. Most hill soils are commonly lacking in phosphates and lime. The authors recommend the equivalent of 100 to 200 pounds of high grade superphosphate per acre. Usually 500 pounds of lime per acre drilled or 1,000 pounds applied broadcast are needed for most hill soils. Following cotton that has been well fertilized with a complete fertilizer mixture there may be enough residual effect to fulfill the needs for the legumes. However it may often prove best to apply mineral elements directly to the legumes at planting and depend on these elements and the nitrogen gathered by the legumes to feed the succeeding crop when the cover crop is turned under. Other details explained in this bulletin include inoculation, methods of planting and turning under the crop, and how to save the seed.

"Progressive Agriculture. Forty-seventh Annual Report for the Year Ending June 30, 1936," Agr. Exp. Sta., Tucson, Ariz., R. S. Hawkins, Actg. Dir.

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Soils

A very comprehensive background in the field of chemical soil tests for determining the nutrient content of soils and requirements for plants is given in U. S. D. A. Miscellaneous Publication No. 259, entitled "Comparison of Various Chemical Quick Tests on Different Soils," by M. S. Anderson and W. M. Noble. Agriculturists who are interested in quick soil tests will obtain much worthwhile knowledge on the correlation between the numerous testing outfits either sold commercially or used by experiment station officials and others. The preliminary investigations presented in this publication give comparative data on the different determinations with a group of widely diversified soils. The sets used included the Simplex, Truog, Morgan, Emerson, La Mott, Indiana, Sudbury, and Hellige. The authors state that while the results from most

of the numerous efforts in evaluating the availability of soil constituents by chemical means have frequently proven disappointing, the short tests aid materially in a more intelligent selection of soils for certain purposes and even made probable a more economical use of fertilizer than if no tests were used. It is not expected that satisfactory results will be obtained with any single test for a particular element on all kinds of soil for all kinds of crops. It is hoped, however, that subsequent developments may make possible more intelligent application of various procedures to different types of soil, thus adding to the practical value of the various testing methods now being used. In many agricultural experiment stations the chemical tests have been found a valuable indicator for the diagnosis of the soil needs when interpreted by trained agronomists. Their value to farmers in states where the tests are extensively used by trained workers cannot be overestimated. Disseminating the data contained in the tables and charts permits a means for selecting the particular soil test that may more nearly answer the requirements for certain needs. The results obtained were for available phosphorus and potassium, acidity, lime requirement, and nitrates. Soils used were virgin samples of Barnes silt loam, Carrington silt loam, Clinton silt loam, Miami silt loam, Cecil clay loam, Ruston loamy sand, and Caribou loam. The authors conclude that each test has a particular value under certain circumstances, but the scope of their usefulness is not yet defined. For this reason none of the tests is recommended or condemned.

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Economics

The State of Indiana for years has published a very splendid report on commercial fertilizers sold in Indiana. For instance, in their most recent circular, No. 229, Commercial Fertilizers, published by Purdue University Agricultural Experiment Staton at Lafayette, Ind., the summary of inspections is given together with a complete summary of sales by grade of mixed fertilizers and materials. According to the circular 238,390 tons of fertilizers were sold in Indiana in the calendar year 1936, not including 7,147 tons calculated from tag sales of companies that did not report tonnage sale. This compares to 8,000 tons sold in 1883 and 291,193 tons sold in 1929. In 1936 about 84 per cent of the total tonnage sold was represented by 33 grades, while the remaining 16 per cent was distributed over 103 different analyses. It is noted that considerable saving and profit could be made by the manufacturers if the number of grades were reduced. It is interesting to note that since 1920 the pounds per ton of actual plant food have increased from 318 to 494, while the cost per ton of fertilizers in dollars which was $36.92 in 1920 has decreased in 1936 to $30.36, thus reducing the cost per pound of plant food to 6.2 cents in 1936 as compared to 11.6 cents in 1920.

In 1920, 1,680 tons of nitrogen, 24,530 tons of available phosphoric acid, and 3,462 tons of potash were contained in fertilizers used in Indiana. In 1936, the nitrogen content had increased to 5,339 tons, available phosphoric acid content to 33,993 tons, and the potash content to 19,925 tons.

In 1902, 679 samples were reported, of which 335 were equal to the guaranty in every particular, 564 were equal to the value of the guaranty, 93 were within 10 per cent of the value of the guaranty, and 22 were not within 10 per cent of the value of the guaranty. In 1936, 1,493 samples were reported, of which 1,259 were equal in every particular to the guaranty, 1,423 were equal to the value of the guaranty, while only 60 were within 10 per cent of the value of the guaranty, and only 10 samples were not within 10 per cent of the value of the guaranty. This improvement in a closer approximation of the guaranty analysis is a good indication of the refinement in the technique of production of both mixed fertilizers and materials.

The tabulation showing tonnage of the different grades of fertilizer shipped to each parish in the State of Louisiana from September 1, 1936, to June 30, 1937, prepared and issued by the Department of Agriculture and Immigration of the state of Louisiana, furnishes a splendid picture of the fertilizer industry in the state. Even though the report covers only the 10-month period from September 1 to June 30, it is a very good indication of the trend in total consumption and in the shifting in the various materials

and individual analyses. Very little fertilizer is actually sold during the months of July and August, thus the report is a fairly close indication of the total consumption of commercial fertilizers in the state of Louisiana. According to the report, the total of 142,826 tons of fertilizers were shipped during the 10-month period. Of this total, 82,010 tons were in the form of mixed goods and the remainder of 60,816 tons was material. The most popular single grade within the state from the tonnage standpoint was 4-8-4, which represented 29,345 tons of the total. In the material list, nitrate of soda constituted the greatest tonnage, representing 25,646 tons. Cyanamid was second with 16,649 tons.

An analysis of the cost of producing milk in Vermont is given in the Vermont Agricultural Experiment Station Bulletin No. 421, "Studies in Vermont Dairy Farming," by G. E. Bond and J. A. Hitchcock. The bulletin confines itself to the discussion of factors affecting winter milk production costs in the Champlain Valley in western Vermont. Practically no consideration is given to the value or effect of the various types of pastures during the pasture season. The study is based on records secured from 450 dairy enterprise records for the year ending March 31, 1933. While the price relationship and business conditions were entirely different in 1933 than at the present time, the physical factors affecting the cost of producing milk have not changed materially. At that time price relationships were particularly unfavorable to the dairy enterprise, and the estimated production cost exceeded the selling price of milk in nearly every case.

Grain was fed in the winter at an average rate of 5.2 pounds per cow per day, equivalent to 1 pound to 2.6 pounds of milk. It was found that as the amount of feed increased from about 2 pounds to 6 pounds per day, the average daily milk production per cow rose from 10 pounds to 15 pounds, and the net cost of producing a hundredweight of milk declined. In a herd which was fed more than 7 pounds of grain per cow per day the average milk production was still little more than 15 pounds, and the net cost per hundredweight was higher than on the farm where the average amount of grain fed was slightly less. It appeared that the season of freshening had some influence on the point at which unit costs were lowered through the variation in amount of grain fed.

It was found that the production cost per cow was lower and the net cost per hundredweight of milk produced was higher on the farms where the majority of the grain was home-grown, than on those where most of it was purchased. Milk yields tended to be heavier with higher digestible protein content of the grain ration. A part of the difference in production associated with home-grown and purchased seed was due to the relatively larger amount of digestible proteins in the purchased seed.

The silage cost more per hundredweight of digestible nutrients than did the hay. Production of milk increased as the silage feeding rate rose, but it did not keep pace with the higher cost of the ration. Consequently the feed cost per hundredweight of milk became higher as more silage was fed.

Production per cow did not vary with differences in the rate at which hay was fed, and the herds which received relatively small amounts of hay produced milk at a lower cost than did those which were fed hay more heavily. The evaluation placed on legume hays was about $2.60 higher than on other kinds of hay, and the difference in the valuation seemed to have been fairly well worked out, in view of the fact that the difference in value of product reflected the higher feeding values.

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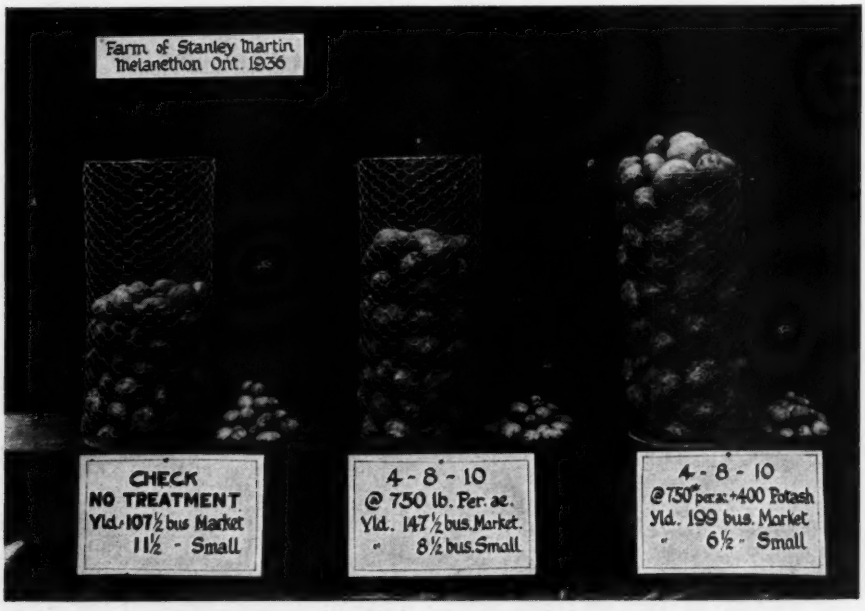
Why Not Ask the Soil What It Wants?

(*From page* 16)

plot which received 400 pounds of additional potash yielded 199 bushels. These weights refer to marketable potatoes.

Another test was conducted on the farm of George Drennan of Alliston, Ontario, and the same procedure was followed. Here, contrary to expecta-



This picture tells its own story of crop response to soil treatment.

tions, the phosphorus level was also moderately high, although no phosphatic fertilizers have been used on this field. The potash level was again very low.

The same recommendation was made, namely, a pre-application of 400 pounds of muriate of potash and a further application of 750 pounds of 4-8-10 at planting time. Actually, however, Mr. Drennan applied 500 pounds of muriate due to inaccuracy of the drill.

No fertilizer was used on the main crop, so the comparison is between "no fertilizer" and 500 pounds of muriate of potash plus 750 pounds of 4-8-10. The "no fertilizer" rows yielded 51 bushels per acre and the "built-up" rows 105 bushels. The low yields were due to the rows being unusually far apart and the plants in the row were also spaced farther apart than is the usual custom.

Another test on the farm of Roy Hickling of Barrie, Ontario, required 1,500 pounds of 0-12-15 to bring the phosphorus and potash up to the required level. This additional treatment increased the yield by 32 bushels of marketable potatoes per acre.

An application of 200 pounds additional muriate of potash on the farm of Bradley and Son of Orangeville, resulted in an increase of 20½ bushels.

As a new approach to fertility problems this exploration has been interesting. While we need more specific information as to the optimum levels required for the different farm crops, short methods of soil testing take a lot of guess work out of making wise fertilizer recommendations.

We must "ASK THE SOIL."

When Do Our Soils Need Potash?

(*From page* 22)

od was employed on several soils on which some field fertilizer data were available. Briefly, the soil is digested with the acetate solution and leached with more of the solution until no test for calcium is secured. (These soils are usually neutral or acid in reaction.) The potassium content of the filtrate is then determined.

The writer does not claim that the results will apply to all soils found elsewhere, but it seems to give very good indications in the soils studied. Several soils secured from eastern and southern states were included in the studies, and with the data furnished for these soils a good correlation was likewise secured.

From the field data, plant indications, and laboratory data, the following table was constructed, and while it will no doubt be modified by more extensive tests, it seems to have merit in the cases we have studied.

Potassium Content	*Crop Response*
Under 60 p.p.m.	Good response
60-100 "	Response *
100-124 "	Doubtful
125-199 "	No response ordinarily
Over 200 "	No response

* The presence of organic matter is of considerable significance in this group. Where the organic matter content is high the response may be little.

Soils on which these data were secured were used as standard soils for comparison work with some of the quick methods in the laboratory. Field data substantiated the results generally. The crops used in the field experiments and upon which crop response was determined were sweet clover, alfalfa, corn, cotton, and potatoes.

Conserving the Benefits of Soil Conservation

(*From page* 18)

flour lime in the early spring of 1936 and disked it in. He then applied the 2-1 mixture of muriate of potash and treble superphosphate, 150 pounds to the acre. After packing the ground with a heavy corrugated roller, he sowed it to alfalfa, putting in oats for a nurse crop, three pecks to the acre. Then he used the packer again.

The harvest? He threshed a very good yield of oats and now has an outstanding growth of alfalfa on the whole field. The plants are well-grown, strong, and vigorous, and they cover the ground thoroughly and uniformly.

Other farmers in the locality followed the same routine, with the exception of the fertilizer. Practically every field thus planted succumbed to the adverse weather conditions while the plants were young and tender.

"This is real conservation," says County Agent Jorgensen. "One might say it is super-conservation, since the farmer who used no fertilizer still has the government check to show for his time, labor, and the money he spent.

"But the farmer who fed his seedings of alfalfa and other soil-conservers with suitable plant food has something of more than equal value for the future right there on his farm where it can't get away, and his government check besides is just so much clear 'velvet'. He will be pocketing the profits from this extra effort and expenditure for several years to come."

To put this in other terms, Mr. Evans has converted a surplus of cash crops harvested into a reserve supply of soil fertility, upon which he can draw in future years. Those who neglected the plant food in their program now lack not only the forage for their livestock, but this reserve supply of fertility as well.

The fertilizer was the determining factor. It is the exponent of a higher degree in conservation, the key to super-conservation. The county agent and the committee show no hesitation about confirming this conclusion.

And the farmers who used potash have something over which to be jubilant for a long time to come, something concrete and tangible, beside the knowledge that they made the most of a good opportunity.

Take the Guesswork Out of Wheat-growing

(*From page* 21)

amount of plant food in the soil, or rather to know its deficiency, the soil should be analyzed. This can be done with a very little effort on the part of the farmer by sending a sample of the soil to be sown to wheat to the agricultural college, or to the county agent, or to any reliable fertilizer manufacturer, who will gladly make the analysis and recommend the correct formula, and the amount to use.

Last fall I analyzed my soil. In one field I found the phosphate was medium and the potash very low. The soil is rolling clay and black, and in order to balance the plant food and give me a sufficient amount of potash to finish the crop, I decided an 0-12-12 would be correct. I started sowing the field October 5 using clean graded seed and 250 pounds of an 0-12-12 analysis on a good seedbed. The result at harvest time was 42 2/3 bushels per acre of high quality wheat, weighing 62½ pounds per bushel. On the other field which I sowed a few days later, the result of the test

showed the soil to be low in phosphate and high in potash. At first I thought I would use on 0-20-0 fertilizer to balance the plant food. However, I wanted to seed the wheat to clover and in order to keep up the high potash content of the soil I used 250 pounds of a 2-14-4 to the acre. This field had as good quality wheat as the first one, but on account of water standing on a portion of the field, the yield was 39 bushels per acre.

This year a large amount of the wheat in the wheat sections tested around 40 to 50 pounds per bushel. This made me wonder just what was the trouble with the other growers of wheat. Most of the shrivelled poorer wheat this year was grown on the supposedly best ground on the farms. This good soil, especially the black soil or bottom and sandy soil, is usually deficient in potash. Phosphate is very beneficial and is used mostly in the early part of the plant growth, and the potash is used mostly in the finish of the plant life. Nitrogen should be supplied if there is not a sufficient amount in the soil to produce an abundant top growth. The combination of the three plant foods, nitrogen, phosphate, and potash, in a proper ratio to balance the plant food in the soil, is desirable. And especially, a sufficient amount of potash to finish the crop and to give it quality is ideal.

My wheat this year had rust the same as my neighbors, but what gave me the plump quality grains was an abundance of available potash to finish the crop and resist the ravages of the rust.

C. T. Ames' Camp Proves a Success

(*From page* 20)

kinds that naming them would be out of the question also have used the camp.

But by far the most of the visitors come as members of Boys and Girls Clubs, their gatherings being sponsored by the Extension Department of the Mississippi State College and led by the Boys and Girls Club Agents in each county. M. M. Bedenbaugh, assistant State club agent for North Mississippi, has had charge of the boys and girls in this camp and for weeks at a time during the height of the season remains on the grounds all but continuously, checking out those from one county as he checks in others who take their places. The time of these boys and girls is divided about 50-50 between recreation and some form of instruction.

Boys enjoy swimming, boating, and diving in the lake at Camp Charley Ames.

So, since the mountain would not come to Mohammed, Mohammed has gone to the mountain, and it will be interesting to note at some future time the influence this innovation in agricultural instruction may have on the future of Mississippi farming. Certainly it should prove easier to teach new methods to boys and girls of impressionable ages than to men and women more or less set in their ways. But if the camp does nothing more than afford a means of recreation to the thousands of boys and girls and men and women from Misisippi farms who choose to avail themselves of its facilities, it will be worth many times its cost. Suffice it to say, all who come bless the name of Charley Ames who made it possible.

Boys at the Charley Ames Club Camp being taught how to judge mules. The picture also shows the Club building and a part of the grove in which it is placed.

Study Starvation Signs on Tobacco and Cotton

(*From page* 15)

deficiency would not have been met and the crop would have suffered in growth, yield, and quality.

The fields or areas of the fields showing these symptoms on the cotton plants during the previous year should be carefully noted, and the fertilizer mixtures for the following year's crop should carry at least 2 to 3 per cent of soluble magnesia. The cost of supplying this constituent in the fertilizer mixtures in soluble forms will be very small, considering the benefits to be derived. Its use on affected areas will in many cases increase the yields and quality of the lint as much as 50 per cent, as has been seen recently. Other soils which may not be so badly deficient in this constituent will show less increases, but in all cases where the deficiency is sufficiently pronounced to show a reddish condition of the leaves of the cotton plants, the addition of soluble magnesia will pay and pay well.

If added as side applications immedi-

ately before a cultivation when the symptoms first appear on the leaves of the plant, the deficiency may be remedied in most cases even if no soluble magnesia was added in the fertilizer mixtures used at planting time, provided the cotton is not too far advanced in growth when the application is made. The making of such side-applications before the cotton blooms in normal seasons should be entirely effective in overcoming the deficiency and enable the plants to make normal growth and produce an abundance of bolls containing lint of high quality.

If one travels over the Coastal Plain area of North Carolina or over other portions of this region of the South in late summer or early autumn in many of the cotton fields he will find that the cotton plants have lost or are losing their foliage prematurely. The defoliation has resulted in the stoppage of the growth of the plants and bolls, which results in a lowered production of lint, ordinarily of very poor quality.

This condition is known as "rust" or potash deficiency. In the field results secured by the Department of Agronomy of the North Carolina Experiment Station at three places in the Coastal Plain region of North Carolina in 1935 and 1936, it was found that the use of 400 pounds of a 3-8-3 fertilizer mixture per acre at planting of the cotton did not prevent a serious development of "rust" in the cotton. When 100 pounds of 50 per cent muriate of potash were used as a side-application immediately after chopping, the yield of seed cotton on an average of 2 years on these three fields was increased almost 45 per cent, and the market qualities of the fiber were greatly improved. Too, the size of the bolls was increased about 37 per cent and the weight of individual seed about 32 per cent from the supplemental side-application of 50 pounds of potash (K_2O) from muriate of potash.

Raising Quality Fruit on a Large Scale

(*From page* 8)

proves the quality of the fruit, both in keeping and grades. The percentage of repacks has been decreasing each year under the present fertilizer program, until in 1936 very little repacking had to be done on this orchard.

To realize the full effect of this fertilizer program upon the grades in this orchard, one must first study some of the picking practices. After these tracts are color picked a few times, they are stripped. The value of fertilizer is clearly shown in this last picking. The federal inspection certificates show that from 75 to 100 per cent of this final picking have good red color and will grade about 15 per cent "C" grade. This means 85 per cent extra fancy and fancy apples.

Cover crops play an important part in the production of quality apples, and it is only through proper fertilization that a legume cover crop can be maintained in an orchard under the present practices. With the orchard soil management programs usually practiced, a legume cover crop cannot last long in an orchard. Under constant fertilization with nitrogenous fertilizers and the severe disking that the cover crops are subjected to, the legumes are killed out, and the weeds and grasses take their place.

In contrast to the general run of cover crops, we find those of the Congdon orchard greatly improved with the present fertilizer program. The percentage of weeds and grasses in their legume crops has been de-

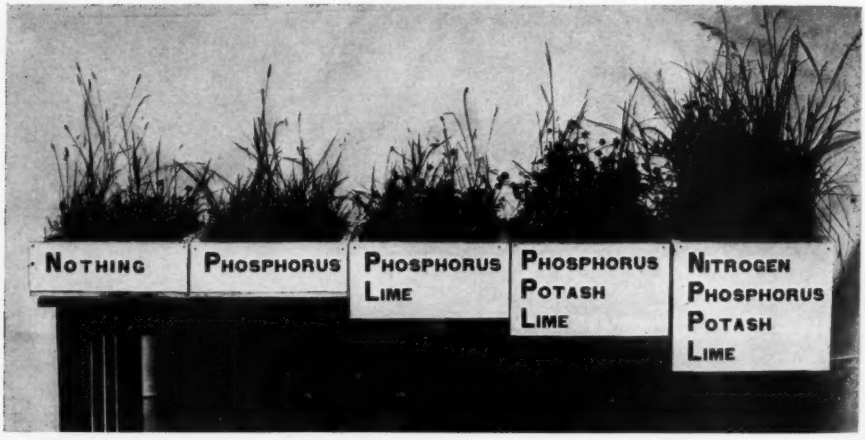
creasing and the quantity of alfalfa increasing. This is brought about by giving the cover crop all of the phosphoric acid and potash it needs. Each year on this orchard the cover crop has to be mashed down so that the pickers can more easily move their ladders and equipment.

The results from these two tracts are typical of the whole orchard. This orchard is divided into 15 tracts, and the fertilizer practices are the same on all of them. The production manager varies his fertilizer application when the conditions show a change is needed.

The fertilizer program on this large orchard has been in the past, and will be in the future, based upon the requirements of the trees for high yields of fine quality fruit. This means fertilizing the soil with mixed fertilizer to supply all the necessary plant foods, including generous amounts of available potash.

The Use of Soil Tests in Conservation

(*From page* 13)



Pounds Dry Matter Per Acre				
1,051	1,392	1,548	1,850	2,501
Pounds Crude Protein Per Acre				
171	235	266	344	488

the most likely to suffer. So far, the conservation program makes no account of this element magnesium. In view of the fact that all of the soils in the humid region embracing the eastern States are beginning to exhibit magnesium deficiency, it is doubtful whether this element can or should be long held out of the conservation picture.

The test for nitrogen either in nitrate or ammonia form may be said to be more unsatisfactory than any of the elements. It does not evaluate the organic nitrogen in the soil, and further, the season of the year has a great deal to do with nitrogen availability. Organic nitrogen becomes available through bacterial activity, and if these organisms are not working, then nitrogen in available form is not indicated. Hence a soil which shows a good nitrate nitrogen content in summer may not appear to be as fertile in winter, while in the spring and fall a good content of ammonia nitrogen may appear.

In general, fields that have recently had a heavy application of manure show a medium to high content of available nitrogen in one form or another, but if the manure application was made a year or more prior to sampling, the test does not indicate so much nitrogen in available form. The following tabular summary indicates how New Hampshire soils tested with respect to the available nitrogen:

	Nitrates	Ammonia
None	201	0
Trace	166	7
Very low	149	660
Low	202	300
Medium	143	17
Medium-high	69	2
High	59	10
Very high	11	4

With a test of very low or below, a soil should receive nitrogen for any crop. A low test may be all right for legumes, but corn, potatoes, grass hay, and other crops should have the nitrogen content bolstered up if the test is low or below the low point in the test. It is interesting to note that 516 samples tested very low or lower for nitrates, while 667 or just two-thirds tested very low or less for ammonia nitrogen. This would indicate a need for a nitrogen application on more than half these soils for any crop.

Looking at these tests from the other point of view and considering that a medium test or above is a satisfactory one for most crops, especially if manure is being used in the rotation, 282 tests or 28% tested at this point or above for nitrates and but 33 or 3% for ammonia. Referring again to grass, hay, corn, and other dairy crops, about three-quarters of the soils need more nitrogen for their production than the tests indicate will be available during the season. With more than half these soils needing nitrogen for the satisfactory establishment and production of legumes and three-quarters needing nitrogen for grass and pasture crops, it seems desirable to place considerable emphasis upon this element in the conservation program.

Tests for phosphorus and potash shown in the following table are less encouraging than for nitrogen.

It is probably fair to assume, as we have done, that when a soil test shows very low phosphorus this element should be applied for any crop, even for grass hay, which uses as little phosphorus as any field crop. Five hundred and eighty-one samples tested at this point, while 935 tests were either low or very low indicating a need for phosphorus in the fertilizer for all crops with the possible excep-

	Phosphorus	Potash
None	0	426
Trace	0	225
Very low	581	185
Low	354	60
Medium	45	29
Medium-high	14	9
High	4	12
Very high	2	54

tion of the grass-hay crop, and if this were being seeded a recommendation for phosphorus even at "low" would surely be made.

A test at medium or above, embracing 65 samples, is probably satisfactory for most field crops, although at "medium" we have recommended phosphorus for seeding and for the corn crop. There is no doubt but that phosphorus presents the most universal need, judging from these tests, although it is not advisable in our region, because of the high soluble aluminum content of the soils, to apply an excess of this element, as it is quickly fixed in insoluble aluminum or iron compounds. Smaller and frequent applications of phosphatic fertilizers are therefore desirable.

Perhaps the most surprising test of all is for potash. It might be expected that a large number of soils would show appreciable quantities of potash, for by far the greater number of these soils come from dairy farms where manure is regularly used in the rotation. It would appear from the results of these tests that the manure on these farms is not being carefully housed and applied without loss, or a more favorable potash test would result. Farmers apparently do not realize that the bulk of the potash from their animals is in the urine. If this portion is not saved by using sufficient bedding or by a tight floor in the manure pit, potash is lost in great quantities. This seems to be what is happening on New Hampshire farms.

Eight hundred and thirty-six samples tested in the three lower groups, showing none, a trace, or very low potash. At these points a complete fertilizer is indicated for top-dressing grass lands or pastures, and if legumes are to be seeded it appears advisable to recommend potash in addition to any manure that is applied prior to the seeding operation.

Samples testing "low" or above this point will be satisfactory for grass-hay production, so far as potash is concerned, but pastures and legume seedings need to have the available potash built up to the medium or medium-high point, at least. This can be done by applying muriate of potash or by using the equivalent in a complete fertilizer.

Looking at these tests from the broader viewpoint, again with clover as an example, 415 soils would produce good red clover without lime, about half, or a little more of them, would need a fertilizer carrying nitrogen or its equivalent in manure, but 935 of the soils tested would need phosphorus and 896 would certainly need potash fertilization, either from manure or from a potash fertilizer, and most of them from both.

Proven Need for Potash

Our temperimental work in New Hampshire has shown such a vital need for potash that we do not believe this element can be neglected, especially in legume or pasture production. In two widely separated experiments on alfalfa, and also on clover, potash proved to be the element most limiting and hence the most profitable substance to apply. Likewise, it has stood at the top in encouraging Dutch clover in pastures and has promoted yields as much as any other substance used on pastures, except nitrogen which is of course the element most needed by the grasses in a pasture stand.

It is for these reasons that we have encouraged farmers not to tie themselves up to a lime program, or to lime and superphosphate, but have tried to point out that a well-balanced fertilization program is not only more far-reaching on conserving and building up the soil, but that it will mean more immediate returns in the way of better legumes and pasture crops. These two things in the long run will mean an earnest participation in the Conservation program.

We Do Some Terracing

(*From page* 10)

young man attached to the county agent's office as soil conservationist secured a ruling that would permit the farm to be used as a demonstration in that locality. He realized that such a demonstration was badly needed and finally he secured the necessary permission.

Let it be said here that those CCC fellows are thorough. They went over every foot of land on the farm; made a map, drawn to scale, that showed the slope, soil character, and condition of the land; laid out the terraces and planned waterways. They also made suggestions about the plantings that should be made in certain fields and promptly vetoed our plan for opening up a piece of woods that would connect two fields and make them into one.

But the terracing outfit couldn't get there right away. Robert waited for it day after day and delayed his planting because those 20-foot strips staked across the fields looked even wider than they were. To plant cotton and corn and then see the planting torn up by a caterpillar tractor and terracing machine was more than human nature could stand. However, one day the "mens" came and began work. We were glad we hadn't planted.

When the "mens" left, the fields looked as if some giant hand had tortured the land in angry reprisal. Added to this, the CCC boys carved straight down one hillside a waterway that looks like a small canal. They built another in a beautiful curve along the edge of the other field and then did some excellent work on the gullies. But, they sodded the waterways with Bermuda or wire grass. That was the crowning insult. Those who came to see our terraces were sorry for us when they saw that "a third of your land is gone into terraces," but when they found that "wire grass" had been used for sodding the two waterways, their commiseration was the more penetrating and caustic.

One relative with the freedom permitted by such relationship, said to Iola, Robert's wife, "I knew Frank didn't have any more sense but why didn't you hit Robert in the head with a hoe before he could agree to that?" So the word got around in the com-

Close-up of waterway coming down from the lespedeza field. Terrace outlets have not yet been turned into the waterway.

munity. Many came to see this outstanding example of folly in farming. One visitor pointed out that he had been cultivating a hill on his place for 50 years and it was still there. I took it that the yields were just as good or that they didn't cost any more to produce than when the land was in its virgin state, though I did not ask the question.

"One-third of the land gone to terraces and two big ditches dug right through the fields and sodded with wire grass! Bare subsoil turned up where the terraces were built."

No need to explain that the whole field could be cultivated shortly, and no land would be wasted. No need to declare that I was not afraid of Bermuda grass as long as cowpeas or lespedeza would grow thickly in the summer and vetch and oats in winter, or that kudzu could be planted on the shoulders of the waterways. Secretly I am a little concerned about that "wire grass," but Robert and I do feel that we can conquer it anytime it starts out into the fields. Anyway, we see no reason why we should plow down into the waterways to carry the grass roots outside.

So we have done some terracing. It was a right expensive job, and the farm looks a little raw right now, but we see ahead 4 years to the time when that 80 acres will be a beautiful rolling piece of land on which contour farming will be followed and where no land is wasted. Better still, we think ahead to the time when excess water will walk down those slopes instead of running and when moisture will be stored in the soil against times of drought. Finally, we dislike to give away soil fertility which we have worked so hard to obtain. We don't mind paying a reasonable price for good fertilizer and for the side applications that we make, but we do dislike to see these wash away when they could be used for crop production on our own acres.

Just a Milk Shake

(*From page 5*)

convince me that little if any opposition would be raised were such a scheme set afloat in Congress next winter.

If by the term "surplus" we stick to Webster, then we probably have no surplus of good milk and healthful dairy products. This is because the dictionary defines "surplus" as "that which remains when needs are satisfied, or something more than sufficient."

Of course low wages are not the only reason why thousands of children do without proper nutrition. Ignorant buying and household mismanagement count for much juvenile starvation. So along with the proposed subsidy we must encourage dairy associations and State legislatures to continue advertising and educational publicity in behalf of milk products, and also emphasize the same in public schools and social centers.

Another situation no doubt having a deterrent effect on the ability of poor people to eat enough milk and dairy products lies in that oft-discussed question of the margins in between—or in other words, presumably wasteful distribution methods and excessive distribution costs. While I have real faith in legislation to act directly as stated above in the form of a subsidy for consumers in the low income class, my hopes are not so

flourishing in respect to legislation to cut down overhead or whittle off the profits. In arbitrary price-fixing you meet right in the whirlpool of strife between production, capital, and organized labor, all groups claiming a certain proprietary interest in the consumer's milk dollar. You get into courts, you are besieged with lawyers and process-servers; or else you get into a jam trying to explain why you stand for higher wages on the one hand, and permit dealers to reduce plant and route wages before they can drop the milk price a cent or two per quart. Each group hides behind the other and we go in a circle.

EACH year we unload reams of surveys and tons of bulletins about the dairy middleman's "milking" propensities, but as long as the cows don't dry up completely there isn't much done about it by effective legislation. Moreover some of the cooperatives which try to supplant the private firms in this line fail to cut the costs to what we think is the salvation point for the masses. Yet if there ever comes a time when justice shall prevail and we reach real efficiency in distribution, my hunch is that it will come through producer unity such as we haven't tasted hitherto. But it won't happen in prosperous days; it will take another financial flop to germinate the movement again after its initial baffling experience under AAA agreements. Like I dismiss oleo and imports from the present dairy scene, I am obliged to "x" out feverish dreams on controlled distribution. Better stick to our original platform—high wage levels and subsidized consumption. It's a lot easier to give something to somebody than to take something away—especially from capital and labor.

It is an old wheeze to advance the idea that better feeding of better cattle will revitalize the dairy industry and put it in sounder shape to withstand risks and losses not of its own making. Yet I am old-fashioned enough to stick to this ancient doctrine, because I believe that we have never found the right method yet to encourage wider and more consistent dairy herd testing and feeding and breeding. Somehow, somewhere, something is lacking. The bright young genius who finds a way to cause more than five or ten per cent of the nation's dairy farms to engage in herd improvement in any one period of time is going to be the economic Babcock of the industry.

Finally we must review the position of the dairy industry in relation to the other major farm commodity groups, because it will be impossible for the dairymen to maintain themselves in security and stability if other branches of agriculture are going haywire.

During the life of the original AAA program, dairymen received two direct and one indirect benefit. Products, purchases, and disease eradication were the direct ones, and price increases for producers of other commodities who might otherwise have shifted to milk was the indirect benefit. Marketing agreements also contributed somewhat to alleviate harsh conditions on certain milk sheds and in the evaporated milk industry.

ONE principal reason why milk received no nation-wide adjustment program when corn-hogs, wheat, and cotton got theirs, lies in the fact that dairying exists in a widespread area under divers market relationships, whereas the other basic commodities are more centralized and knit together in homogeneous regions. If it sometimes seems difficult to cause the wheat farmer to sense the problem of the cotton planter or the orange grower to see things like the peanut producer, then we have often found it five times harder to get the New England milk producer to get the slant on dairying which the midwest manufactured milk farmer has, and vice versa. Compan-

ionship with cows has not apparently worked to make comrades of their owners when it comes to united, forward planning.

It is for this reason that I firmly believe no federal dairy adjustment program, as such, will come in this generation unless we run into tougher times than ever, which we all hope will never happen.

BUT on the eve of another set-to on farm legislation we find the dairymen wondering if some sort of adjustment will not be forced upon the industry whether they want it or not, an adjustment which may catch individual dairymen in a bewildering mesh unles they prepare in advance for a soft cushion on which to land.

The soil conservation program of shifting land from depleting cash and feed crops into legumes and grass meadows is yet regarded by many dairy leaders as a distant threat. Owing to the drought years no real test of its effect on total milk production has arisen as proof one way or the other; but studious men have prophesied that more roughage and more pastures spell more dairy cows and more milk sooner or later.

Their contention is answered by economists who bring little or no ray of hope to the dairymen's outlook either; for opponents of the grass-expansion-dairy-ruin theory point out that corn and cereals make abundant butterfat too. Secretary Wallace himself belongs in this group. He shows that Iowa in the court of King Corn made rapid gains in butter production during the years when butterfat prices were alluring and corn and hog prices were not so good.

Hence looking in either direction at the mile-post on the cross-roads, dairying runs smack into cloudy weather. The present soil conservation program has no price stability or parity guarantee other than an assumed one. The farmers most apt to shift into milk production are now seeking a renewal in some form of the old AAA program, including the ever-normal granary, cash loans, benefits for crop control, and so forth. So far the dairymen in the self-appointed spokesmen states have not taken very kindly to it.

As usual their plea is that nothing in the proposed draft deals directly with milk. Some of them state that they will oppose it unless milk and butterfat become one of the major basic commodities included for loans, benefits, *and* adjustment. Knowing how they behaved toward adjustment previously through scattered leadership and amid complex interests, we gravely doubt how sincere their present intentions are. Perhaps it would be best for them not to be included, but to resolve to help boost and bolster up the situation for the shifters and competitors, so as to keep them happy and clear off the dairy reservation.

THIS, then, is my last idea on the situation. It is for the dairymen to support a reasonable but not extra exorbitant supply and price condition for the growers of corn and cereals, because milk cannot stay up in price very long in the face of ruinous corn prices. Most of the dairymen, at least in the Midwest, grow the most of their own coarse grains anyhow, and the silage and hay situation is more important to them than cereals. Should the dairy industry neglect to support price-stability for the shifters and competitors, and another series of boom crop seasons come, what would be the result in terms of cattle values and butterfat quotations?

Who knows? Maybe the best insurance for the dairymen lies in the cooperative spirit of helping others—helping unfortunate groups of underprivileged milk consumers to get their rightful share, and aiding corn, hog, and wheat growers to maintain security within their own enterprises?

WELL DEFINED

"Willie, what is an adult?"

"An adult is one that has stopped growing except in the middle."

A backwoods farmer was met in the field one day by a modern agriculturist. When asked what he was doing, the farmer said he was driving his hogs down to the woods where they could eat acorns and fatten up for the fall market.

"Why, that's not the way to do," said the agriculturist. "The modern way is to build a pen in the yard and carry the acorns to them. It'll save lots of time."

The old man looked at the visitor for a moment, and then in utter disgust said: "Hell, what's time to a hog?"

"Well, Sam, I see you're back for fighting with your wife. Liquor again?"

"No, sah, Jedge, she licked me dis time."

WELL NATURALLY

"What did the hen say when she laid the square egg?"

"Dunno."

"She said 'Ouch'!"

Tottie (aged 5): "I wonder why babies is always born in de nighttime?"

Lottie (aged 7, a little wiser): 'Don't you know? It's cos they wants to make sure of findin' their mothers at home."

The young city girl went swimming in the nude in a secluded mill pond. Along came a little boy who started to tie knots in her clothes. She flopped around, found an old washtub, held it up in front of herself and marched toward the little boy, saying: "You little brat, do you know what I'm thinking?"

"Yes," said the little brat, "You think that tub has a bottom in it."

"Sophisticated! My dear, that child wouldn't even believe that the stork brought baby storks!"

WELL, WELL, WELL

Mistress: "This food tastes terrible. Did you salt it?"

New Cook: "Yes'm, but I never used that brand before. It was called Epsom Salts."

"Madam," said the policeman kindly to a little old lady who persisted in crossing the street, anywhere but at the corner, "you are jay walking again."

"No such thing," she snapped. "It's rheumatism!"

A pious and uncommonly homely spinster was accosted by a staggering drunk.

"Lady," he said, "you're the homeliest persons I ever saw."

"And you, sir," replied the spinster, "are the drunkest man I ever saw."

"Mebbe so, lady," countered the drunk, "but I'll be okay tomorrow."

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